



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/659,604	09/11/2000	David A. Greve	00CR029/KE	4765

7590 10/31/2003

Kyle Eppele
Rockwell Collins Inc
400 Collins Rd NE
Cedar Rapids, IA 52498

EXAMINER

OPIE, GEORGE L

ART UNIT	PAPER NUMBER
----------	--------------

2126

DATE MAILED: 10/31/2003

3

Please find below and/or attached an Office communication concerning this application or proceeding.

24

Office Action Summary

Application No.

09/659,604

Examiner

George L. Opie

Applicant(s)

David A. Greve

Art Unit

2151

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
 2. ☐ received in Application No. (Series Code / Serial Number) _____.
 3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 14) ☒ Notice of References Cited (PTO-892)
- 15) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2
- 17) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☒ Other: Text Docs for USP6,151,618 USP5,761,625

Art Unit: 2126

DETAILED ACTION

1. Request for copy of Applicant's response on floppy disk:

Please help expedite the prosecution of this application by including, along with your amendment response in paper form, an electronic file copy in WordPerfect, Microsoft Word, or in ASCII text format on a 3½ inch IBM format floppy disk.

Please include all pending claims along with your responsive remarks. Only the paper copy will be entered -- your floppy disk file will be considered a duplicate copy. Signatures are not required on the disk copy. The floppy disk copy is not mandatory, however, it will help expedite the processing of your application. Your cooperation is appreciated.

2. The U.S. Patents used in the art rejections below have been provided as text documents which correspond to the U.S. Patents. The relevant portions of the text documents are cited according to page and line numbers in the art rejections below. For the convenience of Applicant, the cited sections are highlighted in the *text documents*. Consistent with Office procedure, the U.S. Patents corresponding to the *text documents* are also included with this action.

3. Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wahbe et al. (U.S. Patent 6,151,618) in view of Honcik et al. (U.S. Patent 5,761,625).

As to claim 1, Wahbe teaches a computing system comprising
a first general purpose microprocessor having a first set of native instructions (appropriately translated instructions are executable on processor 102, p7 55 – p8 11)
a first virtual machine disposed in ROM, and executed by said first general purpose microprocessor (virtual machine of the present invention is a software implemented operating system ... designed for ... the Intel x86 series, p10 54 – p11 18)

Art Unit: 2126

a first predetermined subset of said first set of native instructions (Intel x86 instruction set, p12 36-52) wherein instructions in said first predetermined subset are likely to result in defects when executed (unsafe instructions, p15 24-32)

a first virtual machine instruction subset (safe ... virtual machine instruction set, p10 54 – p11 18) which includes said first set of native instructions, except for said first predetermined subset (eliminating support for general-purpose or global pointers, p5 19-36)

said first virtual machine instruction subset is used by said first virtual machine (safe sequence of machine executable instructions, p6 53 – p7 11).

Although Wahbe does not explicitly disclose the FAA certification recitations, it would have been an obvious modification from Wahbe's safe virtual machine teachings to apply this reduced instruction set system in an operational management facility for avionics. Wahbe provides a safe general purpose virtual machine, and this secure system would be ideal in an avionics environment with its fail-safe focus.

Honcik teaches the "Federal Aviation Administration" maintains strict specifications that govern safety qualifications for flight operations/instrumentalities by requiring "that software used with commercial aircraft must be officially certified", p2 13-29 which corresponds to the first virtual machine has received a certification by the FAA, in response to a written claim of an improved assurance level. It would have been obvious to combine Honcik's teachings with Wahbe because the safe virtual machine would provide an inexpensive "trusted" system worthy of FAA certification; in other words, Honcik would be able to incorporate the safe VM reduced instruction set in his avionics program and show that the safe general purpose virtual machine provides great flexibility while conforming to FAA regulations.

As to claim 2, Honcik teaches an "aircraft data management system" that would have been executed on Wahbe's safe general purpose virtual machine.

5. Claims 3-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wahbe and Honcik as applied to claim 2 and further in view of the Admitted Prior Art (APA) in the background of application.

As to claim 3, Wahbe teaches a second general purpose microprocessor which is dissimilar with respect to said first general purpose microprocessor (DEC Alpha processor, p10 54 – p11 18)

a second virtual machine executed by said second general purpose microprocessor (virtual machine 400, p9 36-47).

Wahbe does not explicitly disclose the additional limitations detailed below.

Art Unit: 2126

The APA teaches "multiple dissimilar general purpose microprocessor architectures ... are used in parallel, and their outputs are compared" which corresponds to the means for synchronizing and voting outputs of said first general purpose microprocessor and said second general purpose microprocessor. It would have been obvious to combine the APA with Wahbe because the dissimilar architectures would avoid the problems that can surface from bugs that may arise within a particular processor.

As to claim 4, see the claim 2 rejection supra.

As to claim 5, see the claim 1 discussion supra.

As to claims 6-7, Wahbe teaches the "virtual machine is a metaprogram more generically known as an operating system.", p4 23 and from this, it would have been obvious for one skilled in the art to generate the VMs such that they are distinct compiled versions of an identical original VM code.

As to claims 8-10, the APA teaches the fundamental parallel processing concepts used in the area of avionics, and it would naturally have flowed from the referenced prior art to utilize the simultaneous data delivery and a programmable logic device for maximizing the system's efficacy.

As to claims 11-12, see the discussions of claims 6-7 supra, including the respective base claim and any intervening claims.

As to claims 13-14, Wahbe (p7 et seq.) teaches the use of memory arranged as recited, and the means for "voting" would have come from the APA's reference of this well known subject. Consequently, it would have been an obvious modification for one skilled in the art to provide the memory/voting arrangement as stipulated because the shared storage would be an effective mechanism for output after voting results, thereby making the shared memory a highly reliable production.

As to claim 15, Wahbe teaches the "Intel x86 series" serves as a means for processing, p10 54 – p11 18 as recited.

As to claim 16, Honcik teaches the "Federal Aviation Administration" maintains strict specifications that govern safety qualifications for flight operations/instrumentalities by requiring "that software used with commercial aircraft must be officially certified", p2 13-29 which corresponds to the first and second virtual machines have received FAA certification.

As to claims 17-18, note the certification and VM instruction set discussion in claim 1 supra.

Art Unit: 2126

As to claim 19, note the rejection of claim 18 above. Claim 19 is the same as claim 18, except claim 19 is a method claim and claim 18 is an apparatus claim.

As to claim 20, Honcik teaches the flight management system application, p2 32-35.

6. The prior art of record and not relied upon is considered pertinent to the applicant's disclosure. Each reference disclosed below is relevant to one or more of the Applicant's claimed invention.

U.S. Patent No. 6,587,937 to Jensen et al. which teaches the virtual machines with shared storage in the avionics art;

U.S. Patent No. 6,317,872 to Gee et al. which teaches the reduced instruction set for improved computing security/integrity;

U.S. Patent No. 5,969,668 to Young which teaches the FAA certification process with flight programs;

U.S. Patent No. 5,761,477 to Wahbe et al. which teaches the high assurance virtual machines on general purpose computers.

7. Contact Information:

PTO Policy for Facsimile Submissions:

- ☐ AFTER-FINAL faxes must be signed and sent to (703) 746-7238.
- ☐ OFFICIAL faxes must be signed and sent to (703) 746-7239.
- ☐ NON OFFICIAL faxes should be sent to (703) 746-7240.

All OFFICIAL faxes will be handled and entered by the docketing personnel. The date of entry will correspond to the actual FAX reception date unless that date is a Saturday, Sunday, or a Federal Holiday within the District of Columbia, in which case the official date of receipt will be the next business day. The application file will be promptly forwarded to the Examiner unless the application file must be sent to another area of the Office, e.g., Finance Division for fee charging, etc.

- ☐ All responses sent by U.S. Mail should be mailed to:
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Art Unit: 2126

- ☐ Hand-delivered responses should be brought to Crystal Park Two, 2021 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist). All hand-delivered responses will be handled and entered by the docketing personnel. Please do not hand deliver responses directly to the Examiner.
- ☐ Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist at **(703) 305-9600**.
- ☐ Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Opie at (703) 308-9120 or via e-mail at *George.Opie@uspto.gov*. Internet e-mail should not be used where sensitive data will be exchanged or where there exists a possibility that sensitive data could be identified unless there is an express waiver of the confidentiality requirements under 35 U.S.C. 122 by the Applicant. Sensitive data includes confidential information related to patent applications.



ZARNI MAUNG
PRIMARY EXAMINER